

CLEVITE *brush*

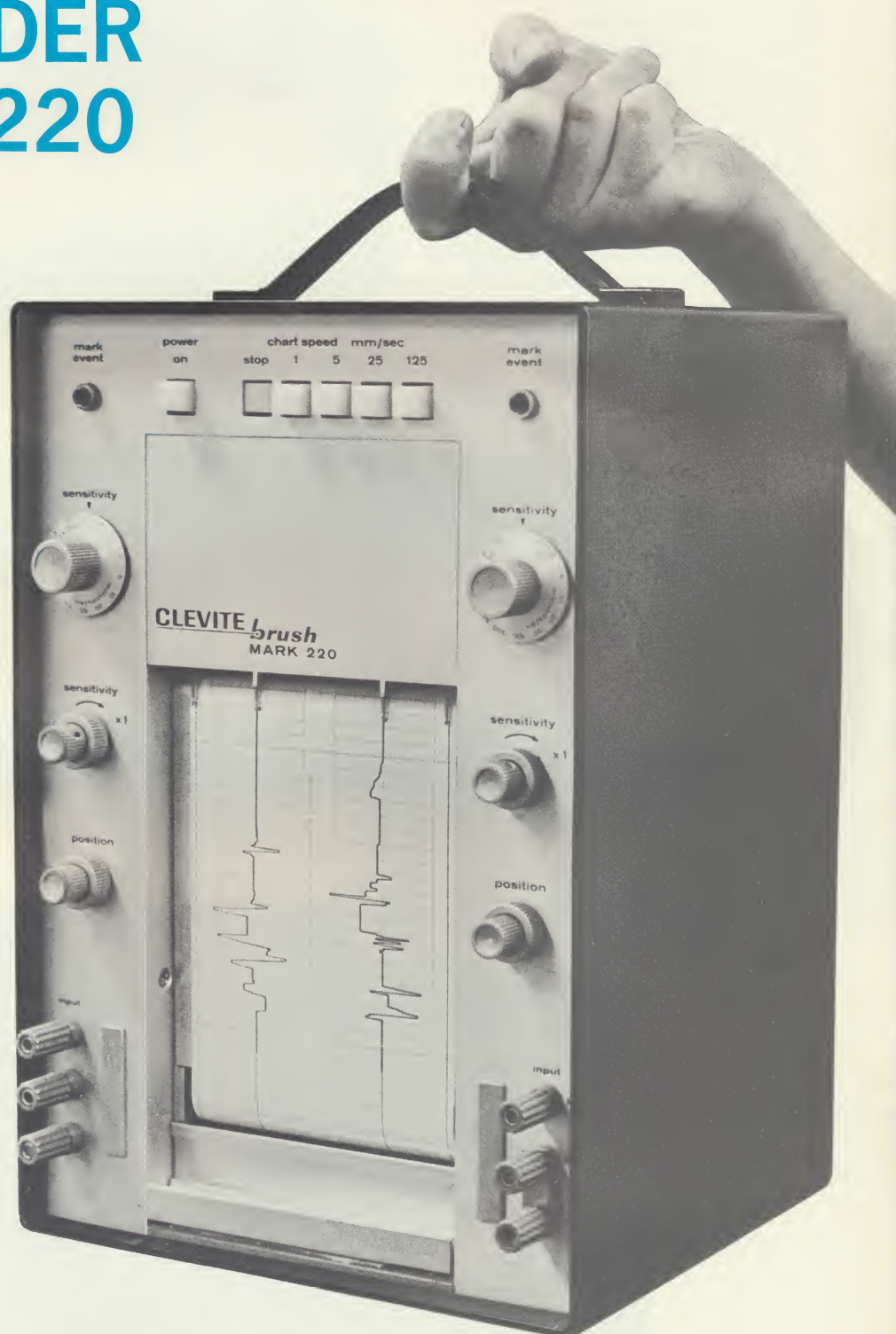
**RECORDER
MARK 220**

2-channel, portable recorder
Model 15-6327-50
trouble-free marking system

BULLETIN
942-1
Effective Date
MAY 15, 1967
Date of last edition:
NEW

RECORDER MARK 220

- Priced for universal application
- Rectilinear marking for easy interpretation
- Lightweight, extremely portable
- Dual-channel convenience
- Unmatched trace clarity
- High-resolution, smudge-free ink recording
- Uses low-cost Accuchart® paper
- Contactless, position feed-back pendrive system ignores dirt, wear
- Reliable, all solid-state electronics
- New, disposable, spring pressurized ink cartridge for greater convenience



MARK 220. Light, simple to operate ...yet tough and accurate.

The Brush Recorder Mark 220 is a completely self-contained portable recorder which weighs just 25 pounds, measures 9" by 13½" by 7¾". It has two 40 mm channels and four pushbutton chart speeds. Maximum sensitivity is 1 millivolt per chart division. Voltages up to 500 volts d-c or peak a-c can be applied to its input terminals without damage to any component—*no matter what the attenuator setting*. Protection of pens against overload is afforded by electrical limiters on both channels.

A pen-position servo system, based on a frictionless transducer, assures extreme accuracy. Penmotor and transducer are fully enclosed and are immune to wear, time and dirt.

Frequency response is flat ($\pm 2\%$ fs) from d-c to 40 cps at 50 div, or from d-c to 100 cps at 10 divisions. Differential input is balanced-to-ground. Input impedance is 10 megohms balanced, 5 megohms each terminal to ground.

The pressurized ink system enables pen to write dry, smudge-free traces. Disposable, plastic ink cartridge can be replaced in minutes. If power is lost or chart paper runs out, the writing system stops immediately and ink is sucked from the pen tip back into the system. "Puddling" cannot occur.

Left- and right-margin event markers (standard) can be manually activated by buttons on the control panel or electrically activated through convenient jacks on the rear panel.

Pen motion is rectilinear to facilitate interpretation of waveforms.

Four chart speeds of 1, 5, 25, and 125 mm per second are changed by electric pushbutton. Chart travel is down, with a tracking error and wander less than 0.025 inches in 10 feet after stabilization at high speed. Chart capacity is 275 feet with high-contrast paper and 400 feet for reproducible paper.



New disposable, self-pressurized ink cartridge. Provides ink supply for about 1 year of normal recording. Found only on the Mark 220.

Servo feedback, core-magnet penmotor uses proprietary Brush Metrisite®, an angular position transducer that is immune to dirt and wear.

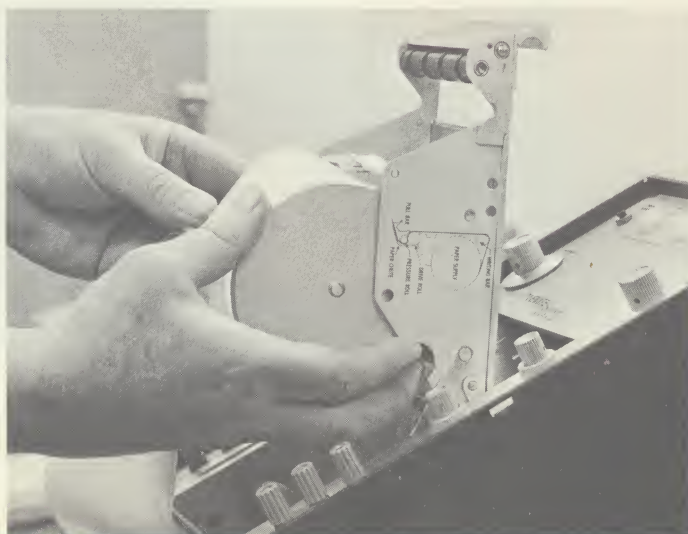


Chart paper roll can be replaced in seconds. Table snaps out and pressure on a lever opens and closes chart holder.



CHART SPEEDS

4 speeds of 1, 5, 25 and 125 mm/sec. (Electrically selected.) Errors non-cumulative with respect to chart run.

EVENT MARKER BUTTONS

Right-channel and left-channel event marker buttons energize event markers when depressed.

ATTENUATOR STEPS

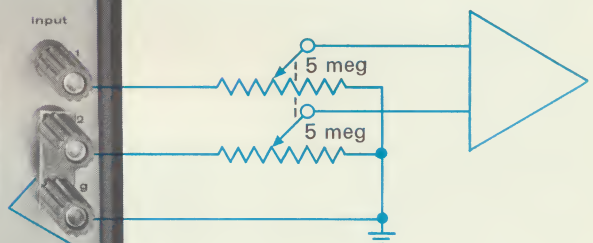
1, 2, 5, 10, 20, 50, 100, and 200 mv/div; 0.5, 1, 2, 5, 10 v/div; "off."

SENSITIVITY

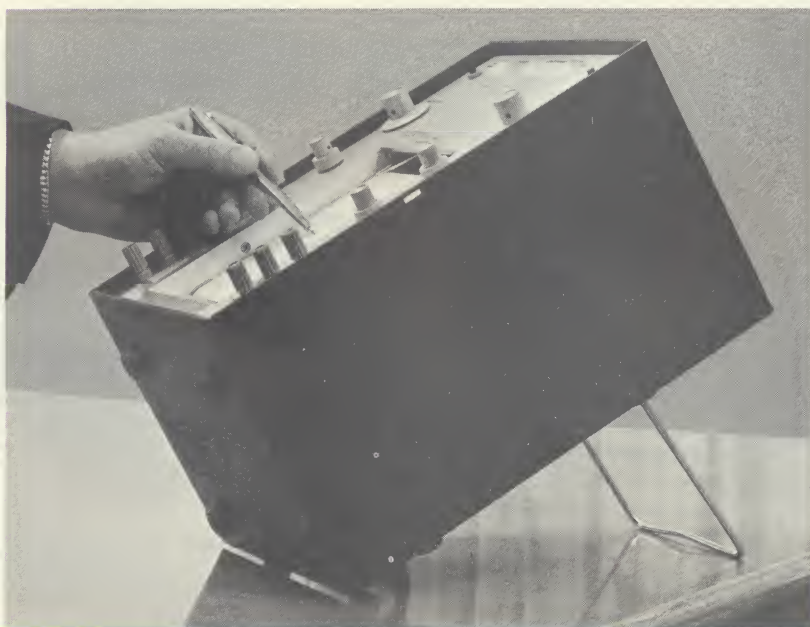
Switched position X1 multiplier. Provides infinite resolution between above steps from 1-to-2.5 times indicated numeral on attenuator dial.

PEN POSITION

± full scale pen position control.



Differential input, balanced-to-ground
Removable ground strap



Unique "tilt bail" lets you set the Mark 220 at a 30° angle for easy chart reading and writing. Recorder stays perfectly balanced—won't tip if accidentally bumped or jarred.

recorder mark 220

Model 15-6327-50

SPECIFICATIONS

Number of Channels	2 analog, 2 event
Channel Span	40mm (50 divisions)
Frequency Response	At 50-div: Flat within $\pm 2\%$ of fullscale from d-c to 40 cps At 10-div: Flat within $\pm 2\%$ of fullscale from d-c to 100 cps, 3 db down @ 125 cps
Trace Presentation	Rectilinear
Trace Width	0.01" nominal
Marking Method	Pressurized Fluid
Marking Fluid Capacity	1 oz. (sufficient for one year of normal recording); replaceable throw-away cartridge
Chart Description	Two 40mm grids graduated in 50 divisions across span. Graduated increments on time axis. Right, center and left event marker channels.
Chart Capacity	High-contrast—275'; Reproducible 400'
Chart Speeds	1, 5, 25, and 125 mm/sec. push-button (electrically) selected
Chart Speed Accuracy	$\pm 0.25\%$
Chart Take-up	Optional at extra cost
Non-linearity ¹ (max. deviation basis)	Less than $\pm 0.5\%$ fullscale d-c

¹Note: This specification represents the maximum departure between the calibration curve and a straight line which best fits the calibration curve expressed as a percent of fullscale deflection.

Sensitivity	Less than 3% deviation from nominal in any 10% increment of measurement scale.
Non-uniformity ²	

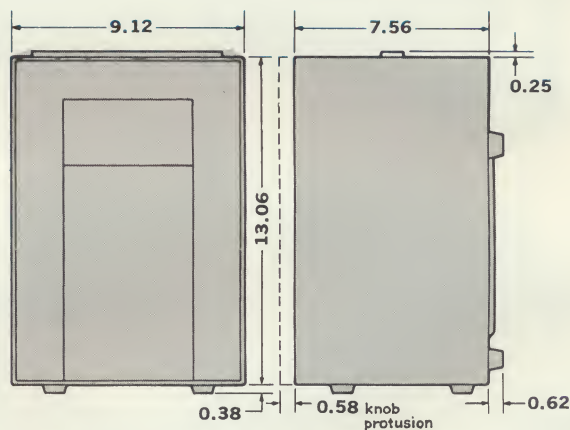
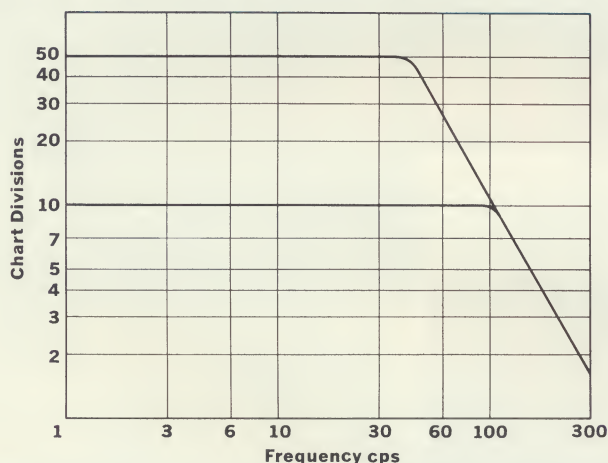
²Note: This specification derives from measurements establishing input vs. deflection characteristic on increments of 10% fullscale, each, thus:—identical inputs of 10% fullscale value (nominal 5-division deflection) are imposed successively at 5-division intervals across scale. Departure of deflection from nominal increment in no case exceeds 3%. (Note that this error includes pen stiction and hysteresis as well as non-uniformity in sensitivity. It is not contemplated under "maximum deviation" non linearity, and is not reported by other manufacturers.)

^{1,2} Cited errors do not include possible chart paper variation due to temperature or humidity.

Input Circuit	Differential, balanced-to-ground
Input Impedance	10 megohms balanced, 5 megohms each terminal to ground
Common-mode Rejection	60 db @ 60 cps
Measurement Range	1 millivolt per chart division to 500 vdc fullscale (50 chart divisions)
Maximum Input Voltage	500 vdc or peak a-c either Input Terminal No. 1 or No. 2 to ground (354 volts rms sinewave)
Controls	See page 3
Power Input	115 volts a-c $\pm 10\%$ 60 cps ³
Power Consumption	Only 120 watts, 175 VA @ 115 volts
Dimensions	See diagram
Weight	25 lbs.

³Units for 115v/50 cps and 230v/50 cps operation available
See Ordering Information below.

Frequency Response vs Amplitude



Ordering Information	Model Number
115 volts, 60 cps	15-6327-50
115 volts, 50 cps	15-6327-55
230 volts, 50 cps	15-6327-56

Accessories	Model Number
Starter Kit	11-6250-00
Includes 12 rolls chart paper, gram gage, 2 pen-adjust wrenches, dust-cover	
Standard package of Brush Accuchart is 12 rolls per carton	

Accessories	Model Number
Replacement Kit	11-6251-00
Includes 12 rolls chart paper, 2 analog pens, 2 event pens, 1 oz. ink cartridge	

Supplies	Model Number
Chart paper	
275' Hi-contrast	11-2923-31
400' Reproducible	11-2923-43
Analog pens	11-2823-33
Event marker pens	11-2873-20
Ink cartridges	11-2730-01

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